Ashland NSP Lakefront Superfund Site

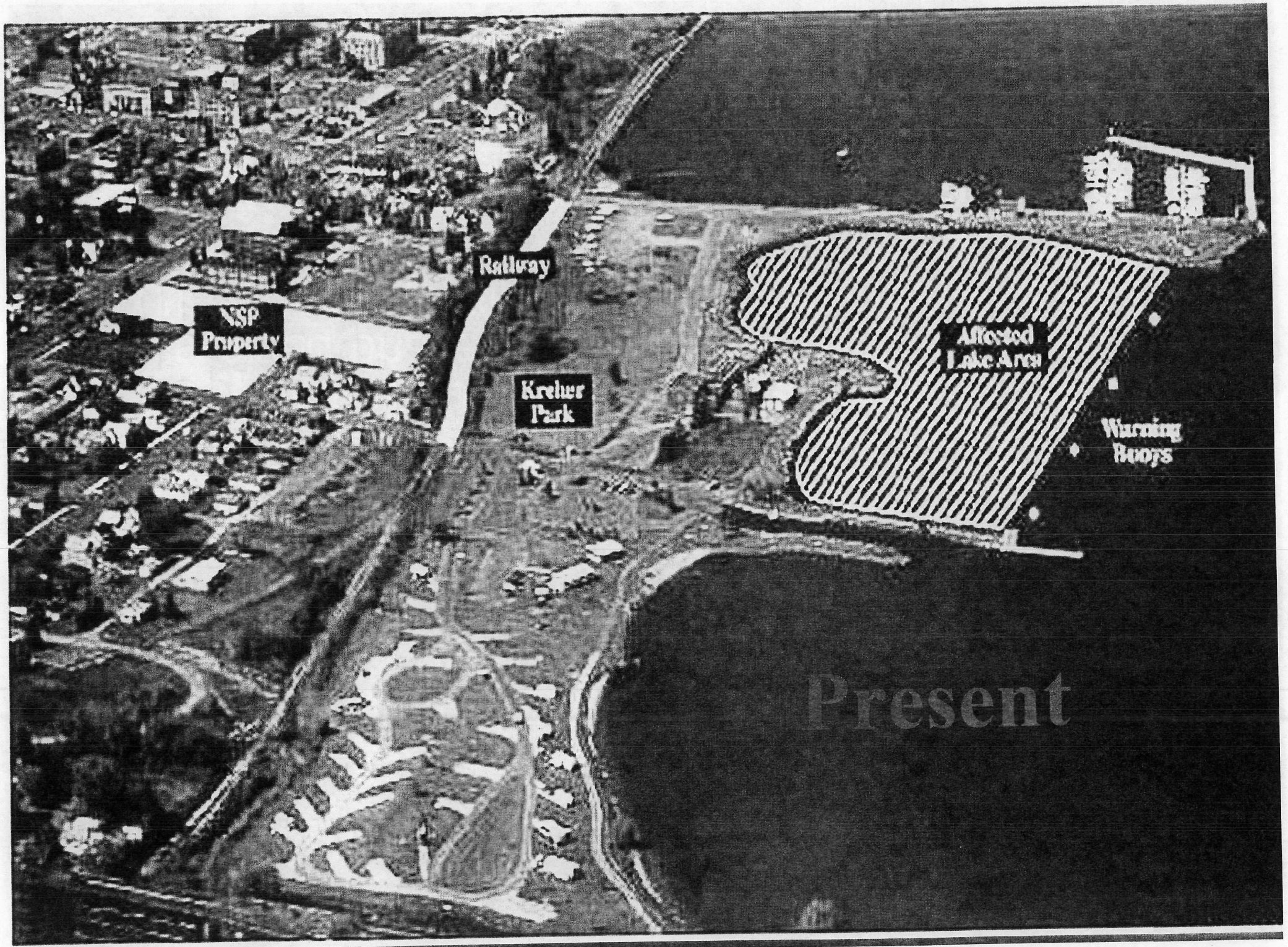
Cleanup Options Information Meeting
December 10, 2008

Remedial Investigation/Feasibility Study

- Looks at site conditions
- Determines the nature of waste
- Assesses risk
- Reviews cleanup technology and the cost
- Evaluates cleanup options based on nine criteria

Remedial Investigation Results
Soil, Ground Water, and Sediment

- Upper **Bluff/Filled Ravine** – soil and ground water impacted by Manufactured Gas Plant waste
- Railroad **Corridor and Kreher Park** – soil and ground water impacted
- **Copper Falls Aquifer** – NAPL and associated dissolved phase ground water contamination (NAPL – contaminants that remain undiluted, i.e. spilled oil)
- **Chequamegon Bay** – 16 acres contaminated sediments between the Marina and the Prentice Avenue boat landing


Railway
NSP Property
Kreher Park
Affected Lake Area
Warning Buoys
Present

EPA Cleanup Evaluation Criteria

Threshold Criteria

(Each cleanup method must satisfy this criteria)

- Protecting human health and the environment
- Compliance with state and federal regulations

Criteria Balance

(Technical criteria with detailed analysis)

- Ability to implement
- Long-term effectiveness
- Short-term effectiveness
- Reduce toxicity, mobility, and volume
- Cost

Modifying Criteria

(Considered after threshold and balancing criteria)

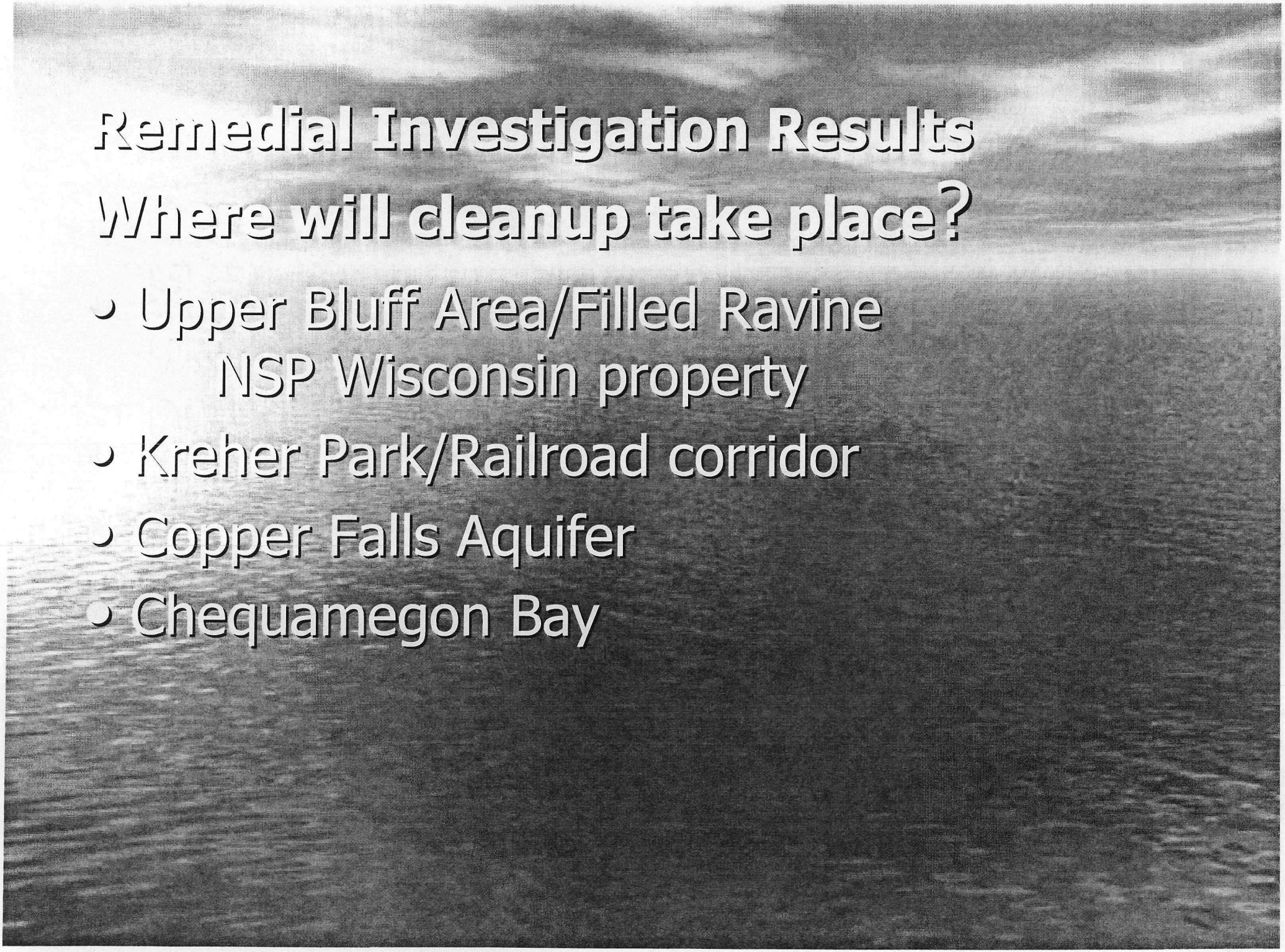
- State Acceptance
- *Community Acceptance

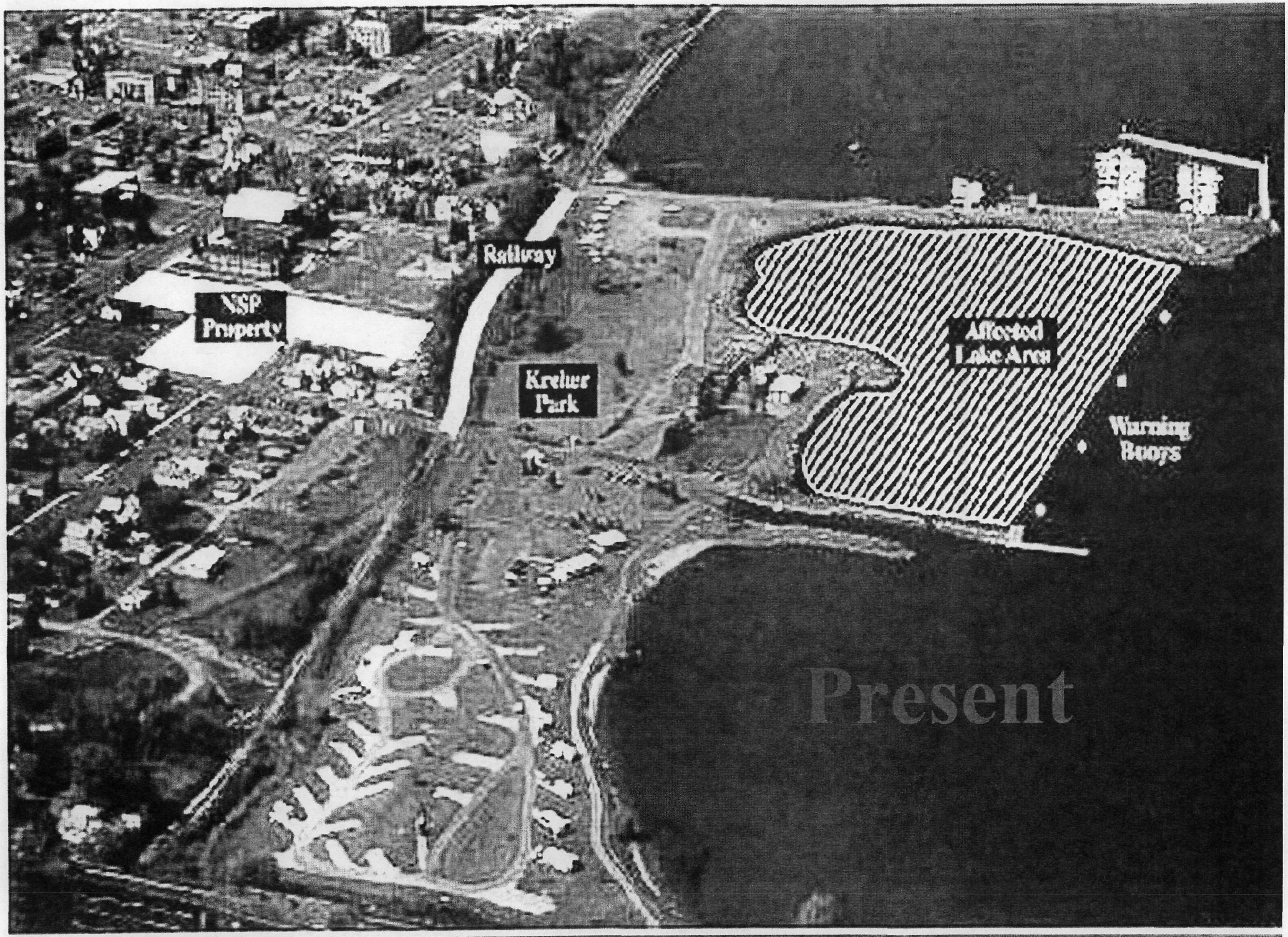
*Community Workshop for Community Acceptance October 25, 2007

- Community members attending workshop identified what would make the cleanup most acceptable
- Responses were organized under common themes

Community Workshop cont'd

- Time, cost, maximum future use, beauty & aesthetics, and least risk of revisiting cleanup were a few themes
- Doing it right the first time and most future use opportunities for the site were rated highest at the workshop


Remedial Investigation Results
Where will cleanup take place?
• Upper Bluff Area/Filled Ravine
NSP Wisconsin property
• Kreher Park/Railroad corridor
• Copper Falls Aquifer
• Chequamegon Bay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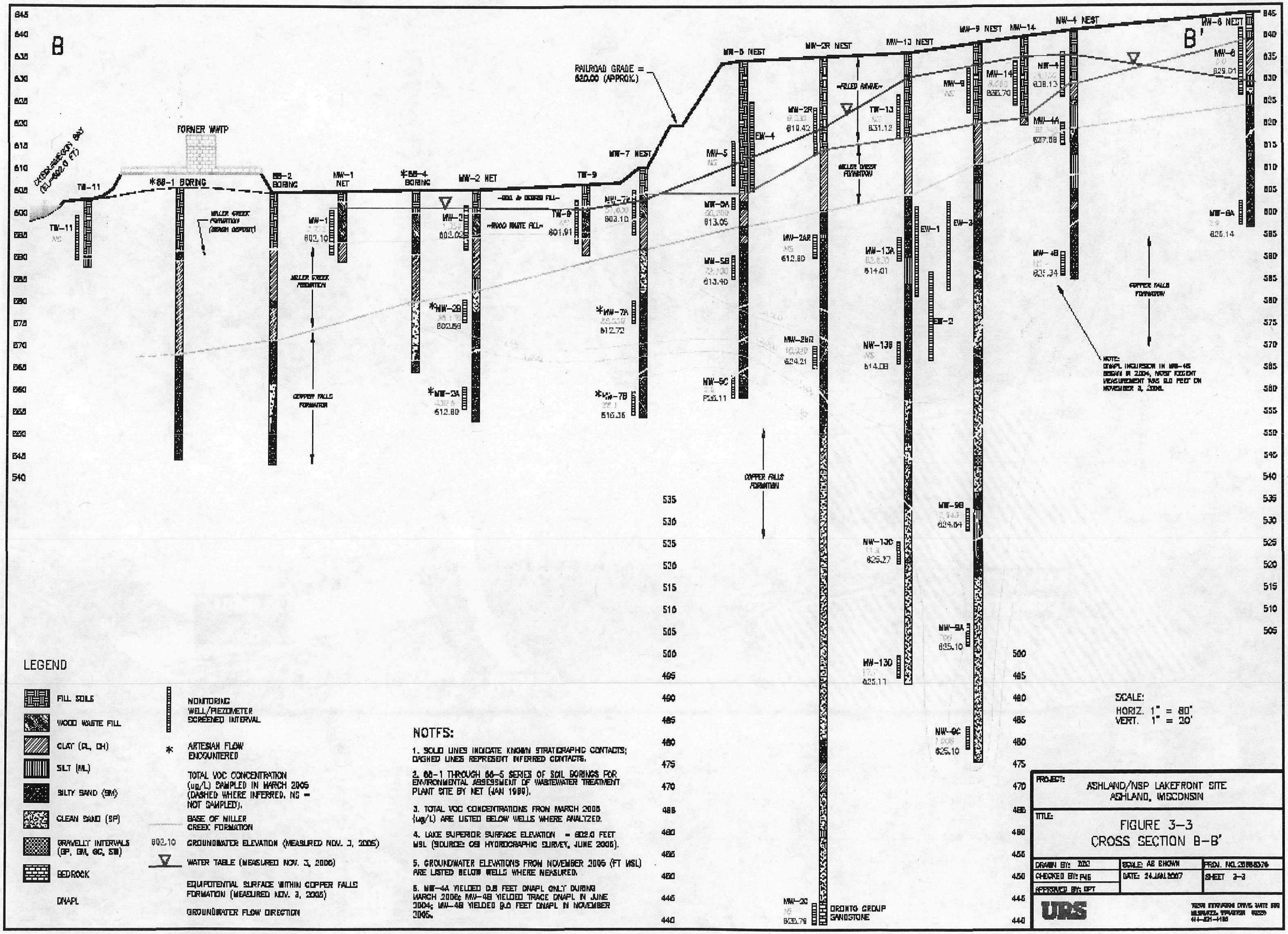


B
B'
FORMER WWTP
RAILROAD GRADE = 620.00 (APPROX.)
MW-5 NEST
MW-2R NEST
MW-13 NEST
MW-9 NEST
MW-14
MW-4 NEST
MW-6 NEST
MW-7 NEST
MW-2 NET
MW-1 NET
*88-1 BORING
88-2 BORING
*88-4 BORING
TW-11
TW-9
TW-13
EW-1
EW-2
EW-3
EW-4
MILLER CREEK FORMATION
COPPER FALLS FORMATION
WOOD WASTE FILL
FILLED RAVINE
ORONTO GROUP SANDSTONE
SCALE:
HORIZ. 1" = 80'
VERT. 1" = 20'
LEGEND
FILL SOILS
WOOD WASTE FILL
CLAY (CL, CH)
SILT (ML)
SILTY SAND (SM)
CLEAN SAND (SP)
GRAVELLY INTERVALS (GP, GM, GC, SW)
BEDROCK
DNAPL
MONITORING WELL/PIEZOMETER SCREENED INTERVAL
* ARTESIAN FLOW ENCOUNTERED
TOTAL VOC CONCENTRATION (ug/L) SAMPLED IN MARCH 2005 (DASHED WHERE INFERRED, NS = NOT SAMPLED).
BASE OF MILLER CREEK FORMATION
602.10 GROUNDWATER ELEVATION (MEASURED NOV. 3, 2005)
WATER TABLE (MEASURED NOV. 3, 2005)
EQUIPOTENTIAL SURFACE WITHIN COPPER FALLS FORMATION (MEASURED NOV. 3, 2005)
GROUNDWATER FLOW DIRECTION
NOTFS:
1. SOLID LINES INDICATE KNOWN STRATIGRAPHIC CONTACTS; DASHED LINES REPRESENT INFERRED CONTACTS.
2. 88-1 THROUGH 88-5 SERIES OF SOIL BORINGS FOR ENVIRONMENTAL ASSESSMENT OF WASTEWATER TREATMENT PLANT SITE BY NET (JAN 1989).
3. TOTAL VOC CONCENTRATIONS FROM MARCH 2005 (ug/L) ARE LISTED BELOW WELLS WHERE ANALYZED.
4. LAKE SUPERIOR SURFACE ELEVATION = 602.0 FEET MSL (SOURCE: OSI HYDROGRAPHIC SURVEY, JUNE 2005).
5. GROUNDWATER ELEVATIONS FROM NOVEMBER 2005 (FT MSL) ARE LISTED BELOW WELLS WHERE MEASURED.
6. MW-4A YIELDED 0.8 FEET DNAPL ONLY DURING MARCH 2005; MW-4B YIELDED TRACE DNAPL IN JUNE 2004; MW-4B YIELDED 9.0 FEET DNAPL IN NOVEMBER 2005.
PROJECT: ASHLAND/NSP LAKEFRONT SITE ASHLAND, WISCONSIN
TITLE: FIGURE 3-3 CROSS SECTION B-B'
SCALE: AS SHOWN
DATE: 24 JAN 2007
SHEET 3-3
URS

RI Results – Upper Bluff

- Free product tars/oils at the base of the ravine
- Clay tile pipe ran from MGP area to seep area
- Some remnants of MGP structures still exist and contain MGP wastes
- Soils and groundwater impacted

RR Corridor and Kreher Park

- Lakebed fill
  - wood waste from former lumber mill operations
  - solid waste/demolition debris
- Includes
  - seep area
  - waste tar dump
  - tank car siding
  - former wastewater treatment plant
- Seep area is outfall from clay tile pipe

RR Corridor and Kreher Park

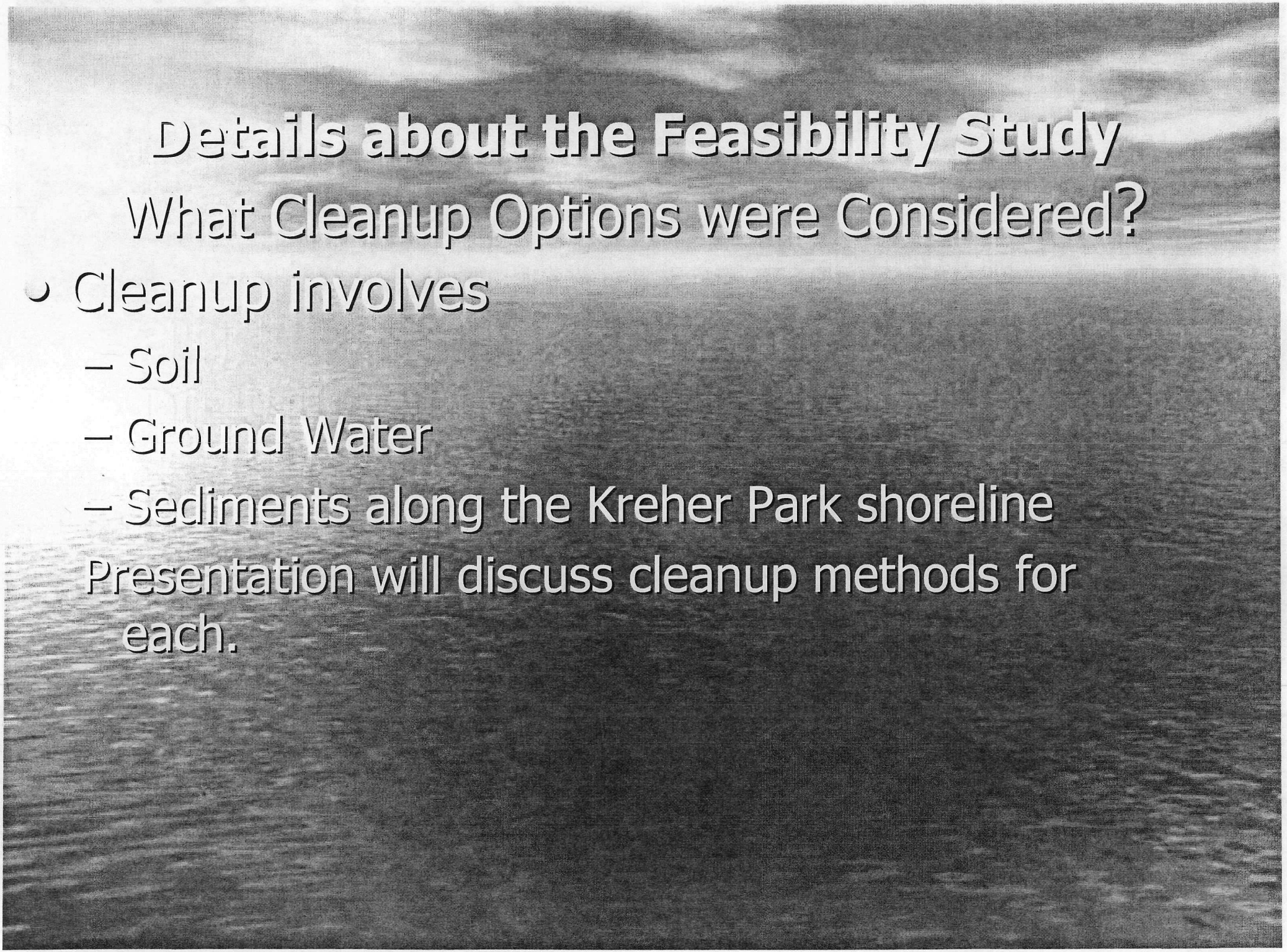
- Soils and groundwater impacted
- Tars/oils exist as free product in areas
- Seep and waste tar dump areas
- Hydraulically connected to the filled ravine and lake/sediments

Copper Falls Aquifer

- Free product mass
  - 30 – 70 feet depth
  - A dissolved phase plume extends north to the shoreline

RI Results - Sediments

- Approximately 16 acres including free product
- Most covered with wood waste
- During wave events free product causes slicks



Details about the Feasibility Study

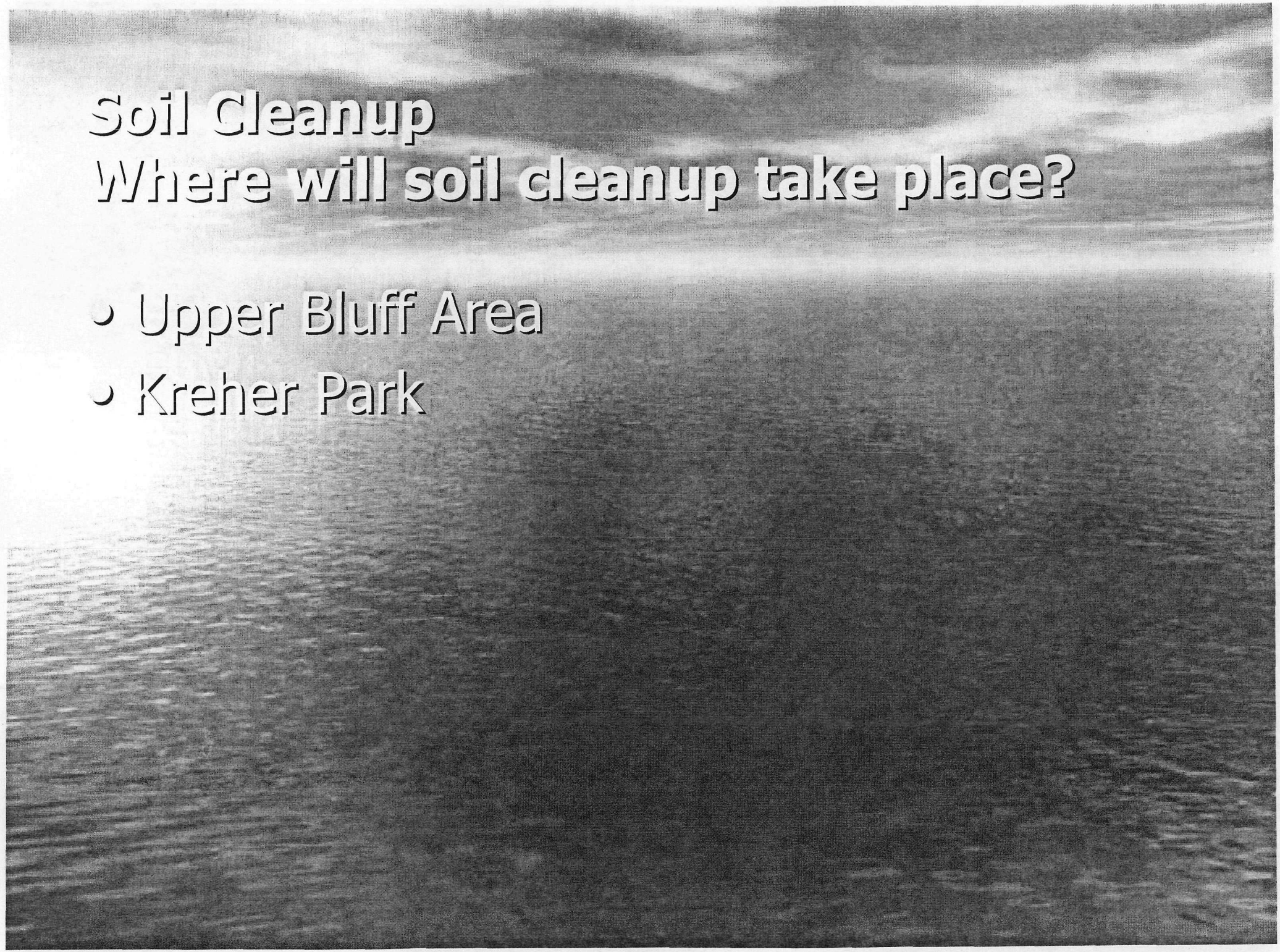
What Cleanup Options were Considered?

- Cleanup involves
  - Soil
  - Ground Water
  - Sediments along the Kreher Park shoreline

Presentation will discuss cleanup methods for each.

Cleanup Considered for Soil, Ground Water, and Sediments

- No action must be considered at every Superfund site meaning that soil, contaminated ground water, and sediments remain in place with no engineering, maintenance, or monitoring



Soil Cleanup
Where will soil cleanup take place?

- Upper Bluff Area
- Kreher Park

Soil Cleanup Option– Containment or Capping Contaminated Area

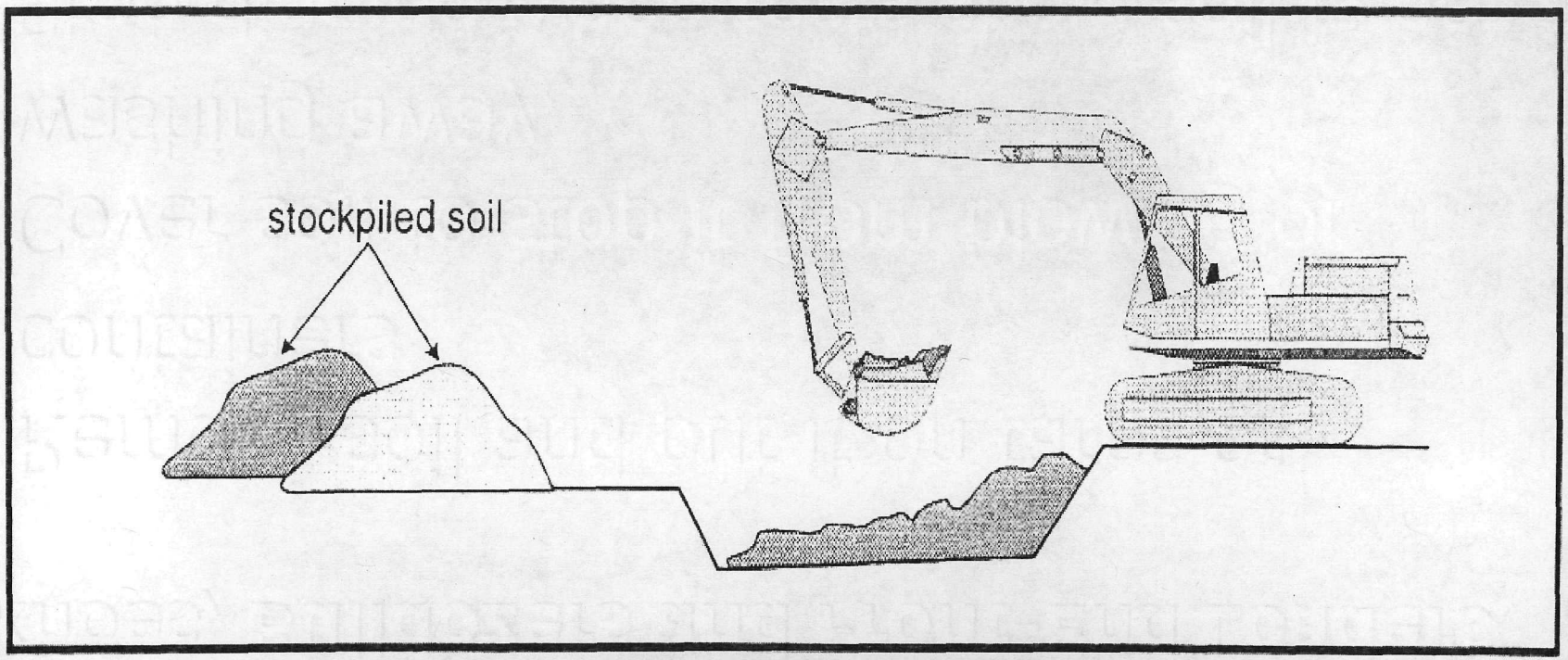
- Stops rainwater from seeping through contamination and into ground water and surface water
- Stops wind from blowing contaminated soil to other areas
- Keeps people and animals from direct contact

Soil Cleanup Option
Limited Removal

- Digging up soil from most contaminated areas
  - portions of Kreher Park
  - upper bluff fronting the park
- On-site or off-site disposal

Soil Cleanup Option
Unlimited Removal

- Digging up **all** contaminated fill material and soil for off-site disposal



What's involved with digging and disposal?
Backhoes, Bulldozers and Front-End Loaders

- Remove soil and put it on tarps or containers
- Cover soil to stop it from blowing or washing away
- Stop digging when tests show soil is not a risk
- Backfill area with clean soil
- Dispose off-site or on-site

Soil Cleanup Option
Limited Removal and On-Site Thermal Treatment

- Remove contaminated soil or sediment by digging up material
- Use heat to treat contaminated soil
- Return treated soil to site as a backfill or off-site disposal

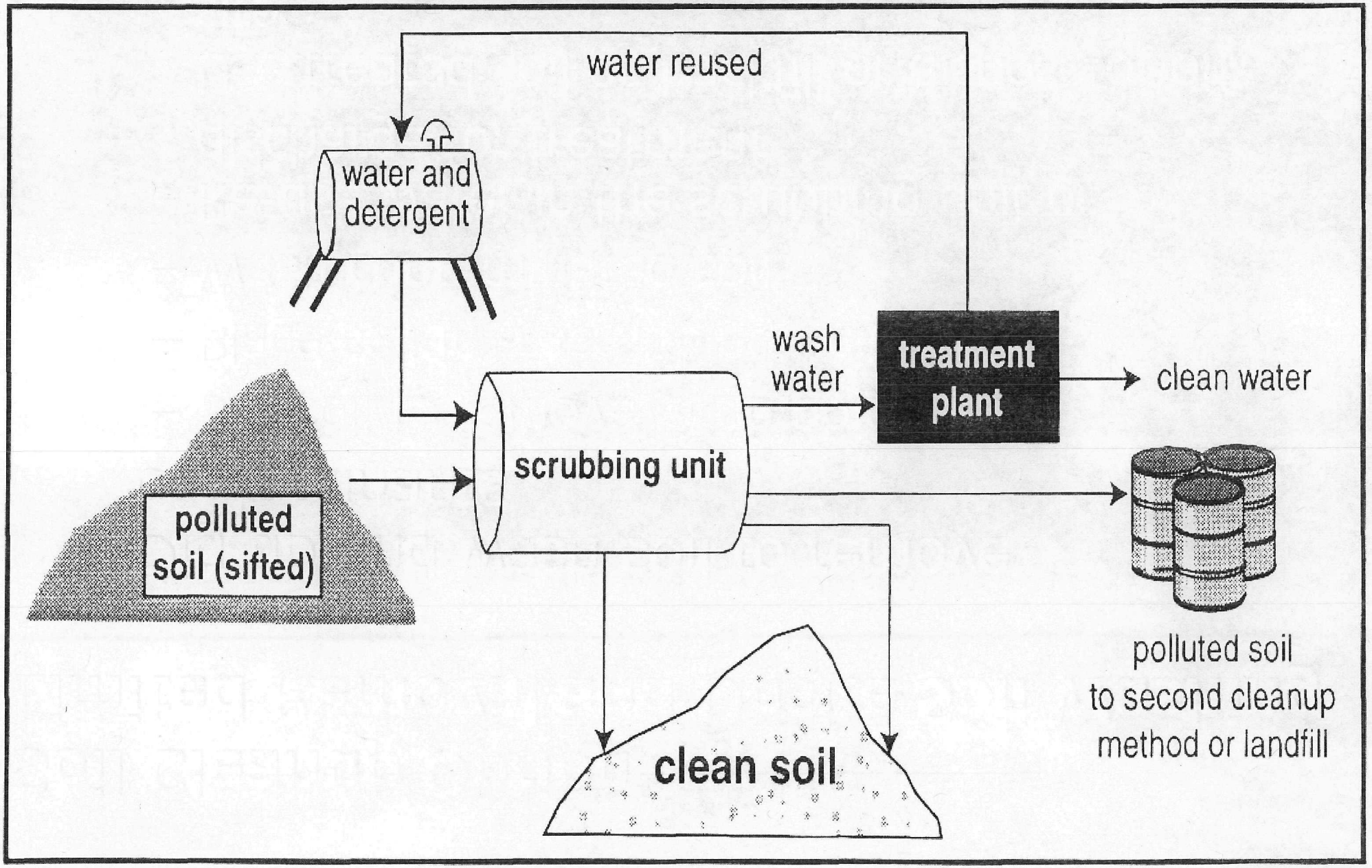
Soil Cleanup Option
Limited Removal and Off-Site Treatment

- Dig up soil in most contaminated area (Upper Bluff) and move material off-site for treatment and disposal
  - Use heat to treat contaminated soil

Soil Cleanup Option
Limited Removal and Onsite Soil Washing

- Dig up and wash soil to remove contaminants
  - Sift soil to remove large objects
  - Place soil in a scrubbing unit
  - Wash contaminated soil
  - Re-use water in the scrubbing unit or discharge for treatment
  - Use treated soil as backfill or dispose of off-site

Onsite Soil Washing



Areas of Ground Water Cleanup

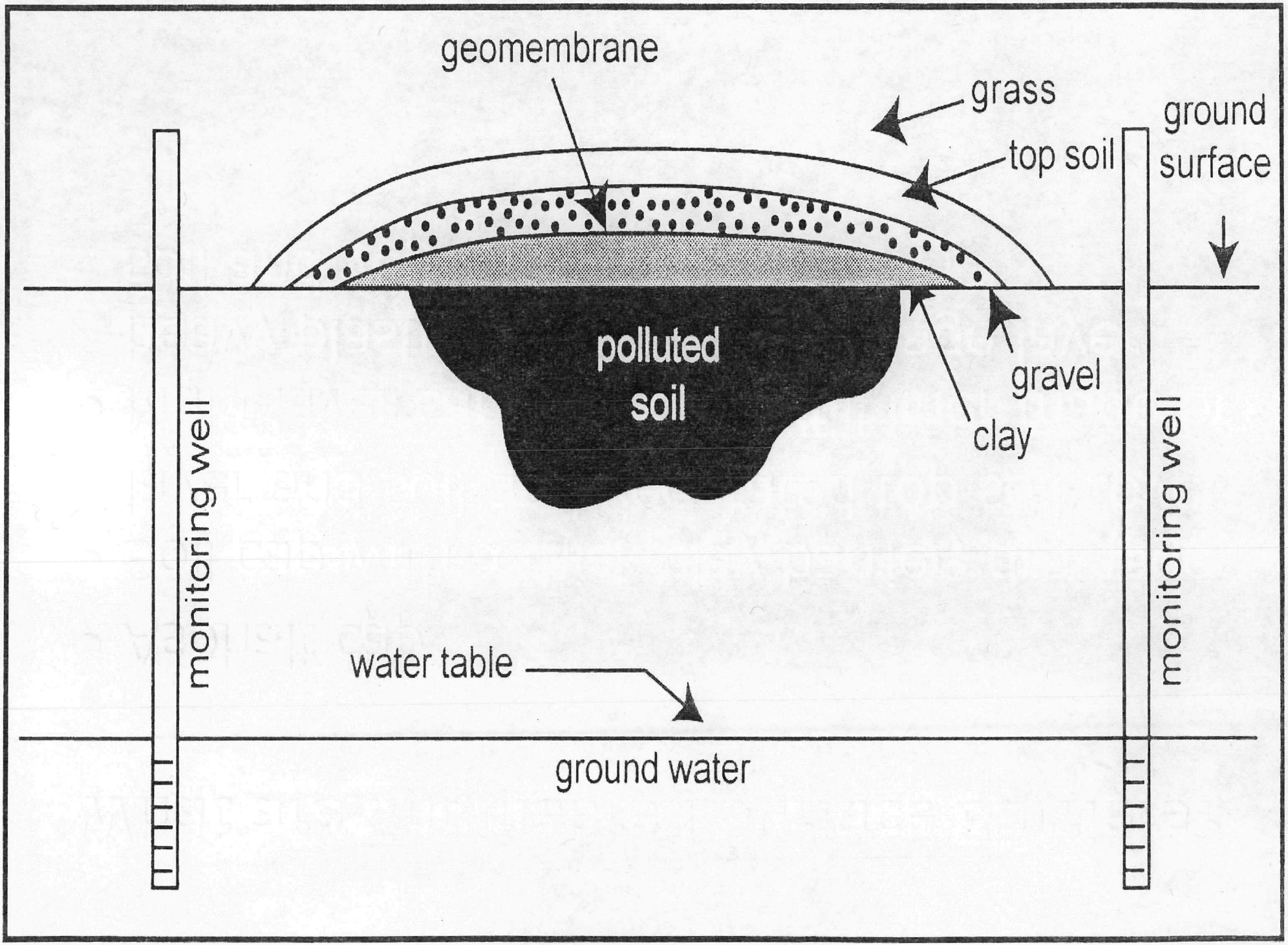
- Upper Bluff Area
- Kreher Park
- Copper Falls Aquifer

Ground Water Cleanup Option- Containment using Engineered Surface and Vertical Barriers

- Natural or man-made barriers to stop exposure of the movement of contaminants
- Barriers are
  - Engineered surface barriers
  - Barrier Wells
  - Vertical Barrier Walls

What are **Engineered Surface Barriers?**

- Asphalt cap
- Soil cap with a thick clay barrier, drainage layer and soil and vegetated top soil cover
- Multi-layer cap with a landfill liner made of heavy plastic material, a drainage layer, soil and vegetated top soil cover


geomembrane
grass
top soil
ground surface
polluted soil
gravel
clay
monitoring well
monitoring well
water table
ground water

Ground Water Cleanup Option
Barrier Wells and Vertical Barrier Walls
Upper Bluff and Kreher Park Areas

- Barrier wells will stop contaminants from moving off site
- Vertical barrier walls are made up of slurry walls or sheet pilings and used for shallow contaminated ground water in the ravine

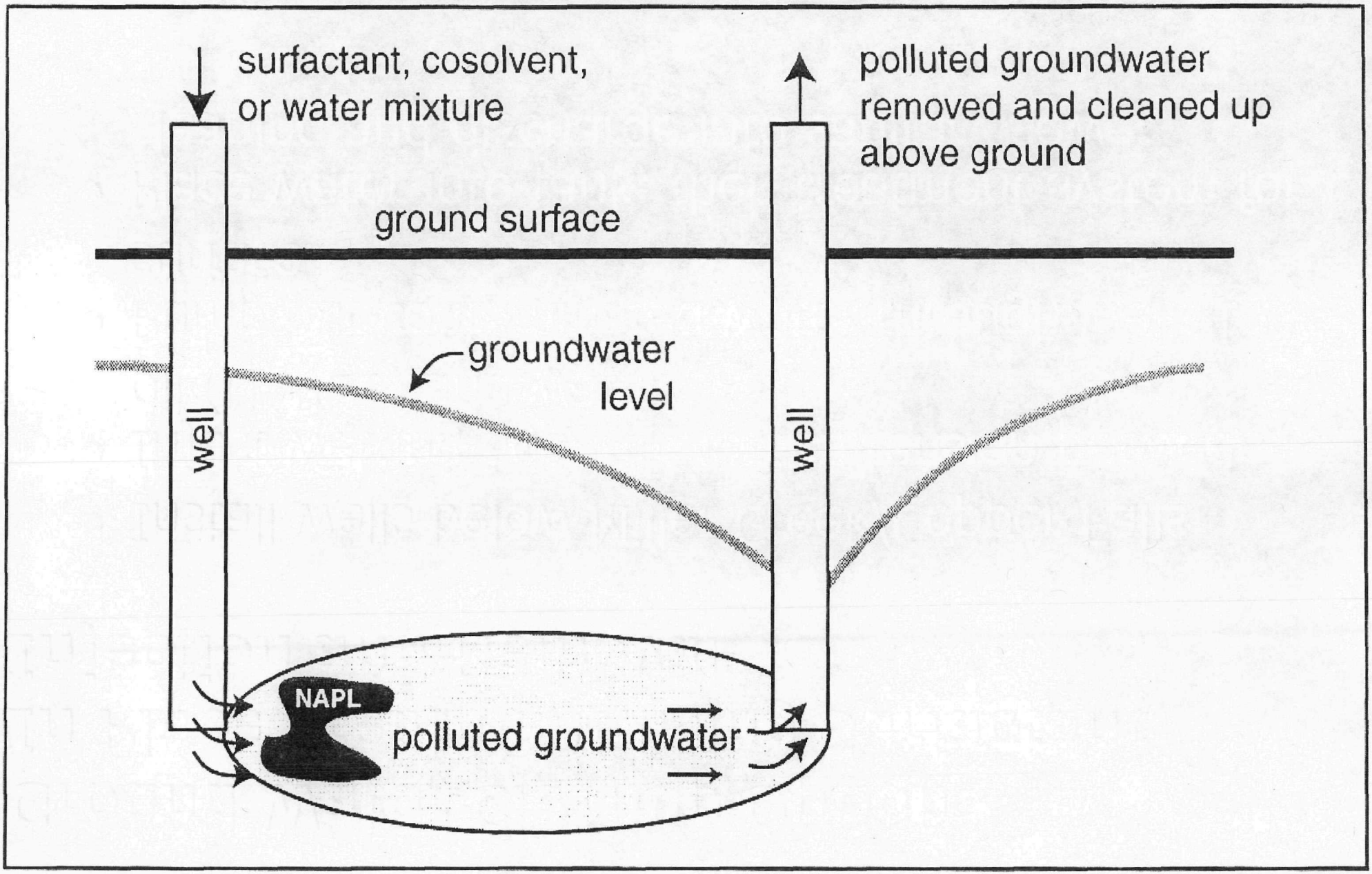
Ground Water Cleanup Option
In Place Treatment using Ozone Sparging

- Inject ozone into the ground to cleanup contaminants
  - Ozone is a gas that decomposes and reacts with contaminants in water
  - Ozone does not work for NAPL's (non-aqueous phase liquid) - contaminants that remain undiluted, i.e. spilled oil

Ground Water Cleanup Option
In Place Treatment using Surfactant Injection and Removal

- Install wells below Miller Creek/Copper Falls
- Inject wetting agent to lessen tension between oil (NAPL's) and water
- Pump out contaminated water through wells to surface
- Place water into tank, then treatment system for cleaning and discharge into sanitary sewer

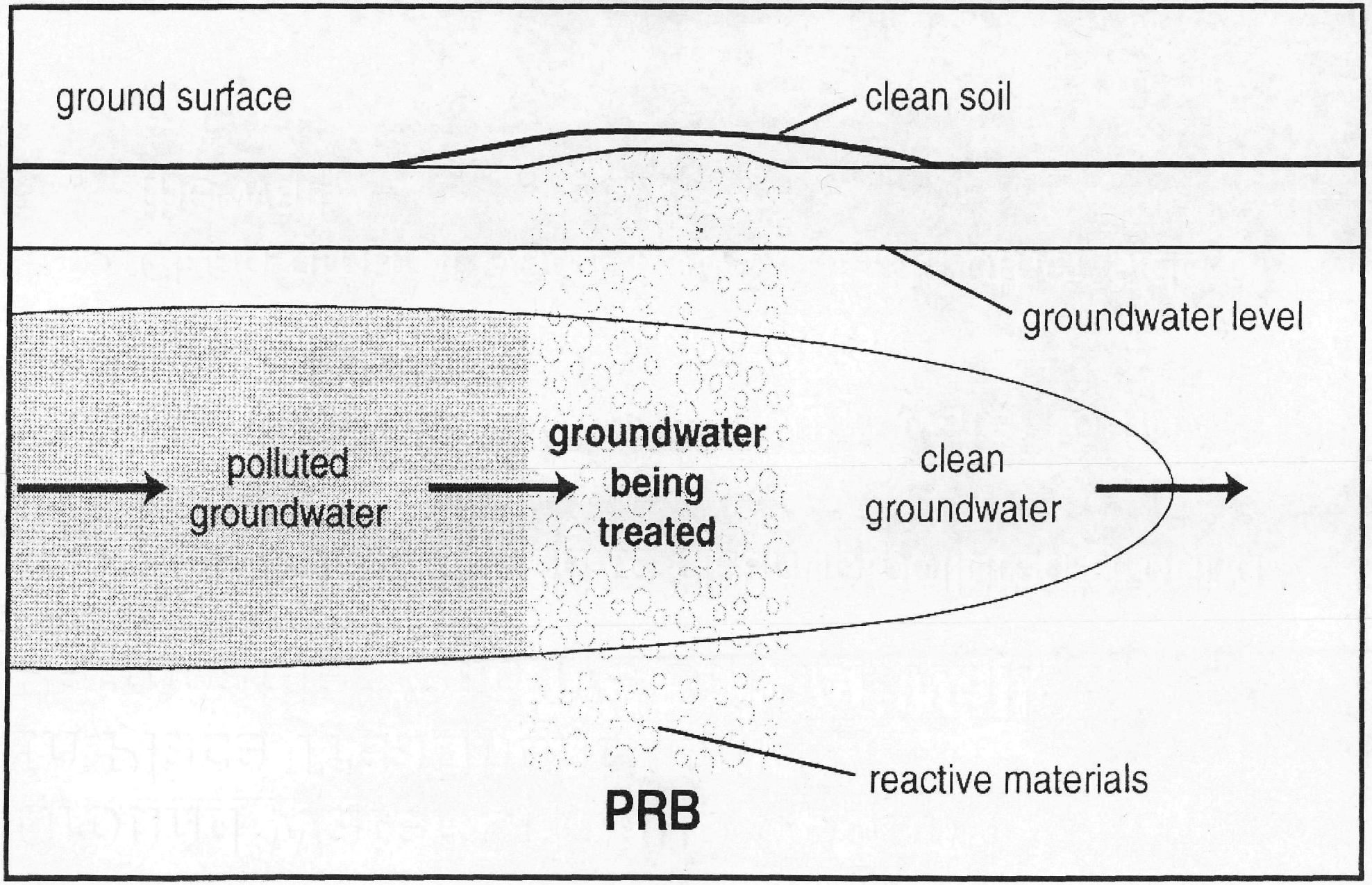
In Place Flushing



Ground Water Cleanup Option In Place Treatment using Permeable Reactive Barrier Walls

- Built below ground to cleanup polluted ground water
- Has tiny holes allowing ground water to flow
- Traps and treats contaminants
- Clean ground water flows out the other side of the wall

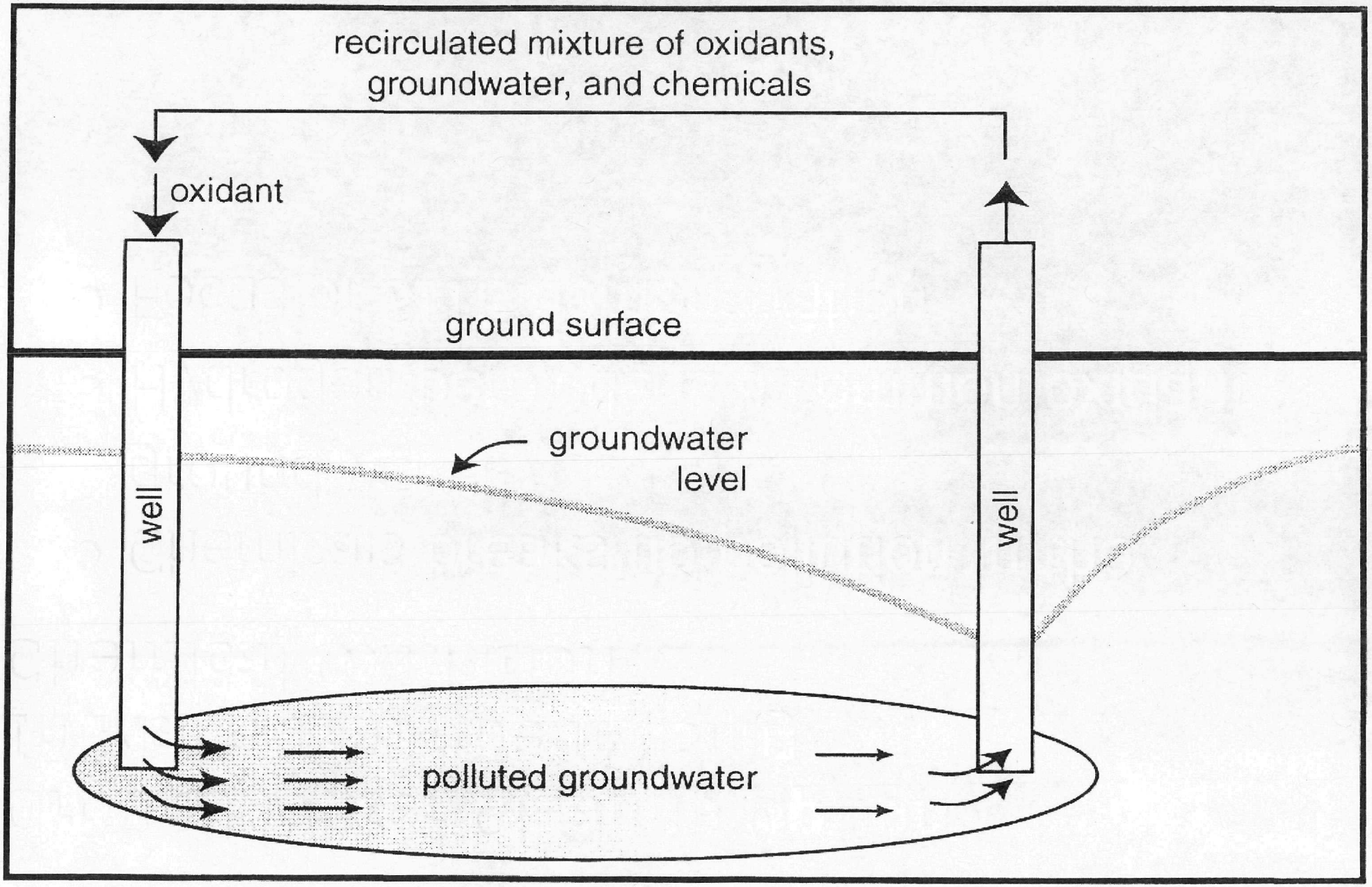
Permeable Reactive Barrier Walls



Ground Water Cleanup Option In Place Treatment using Chemical Oxidation

- Chemicals breaks up pollution in the ground water
- Hydrogen peroxide is a common oxidant
- Focus of SITE demonstration

Chemical Oxidation



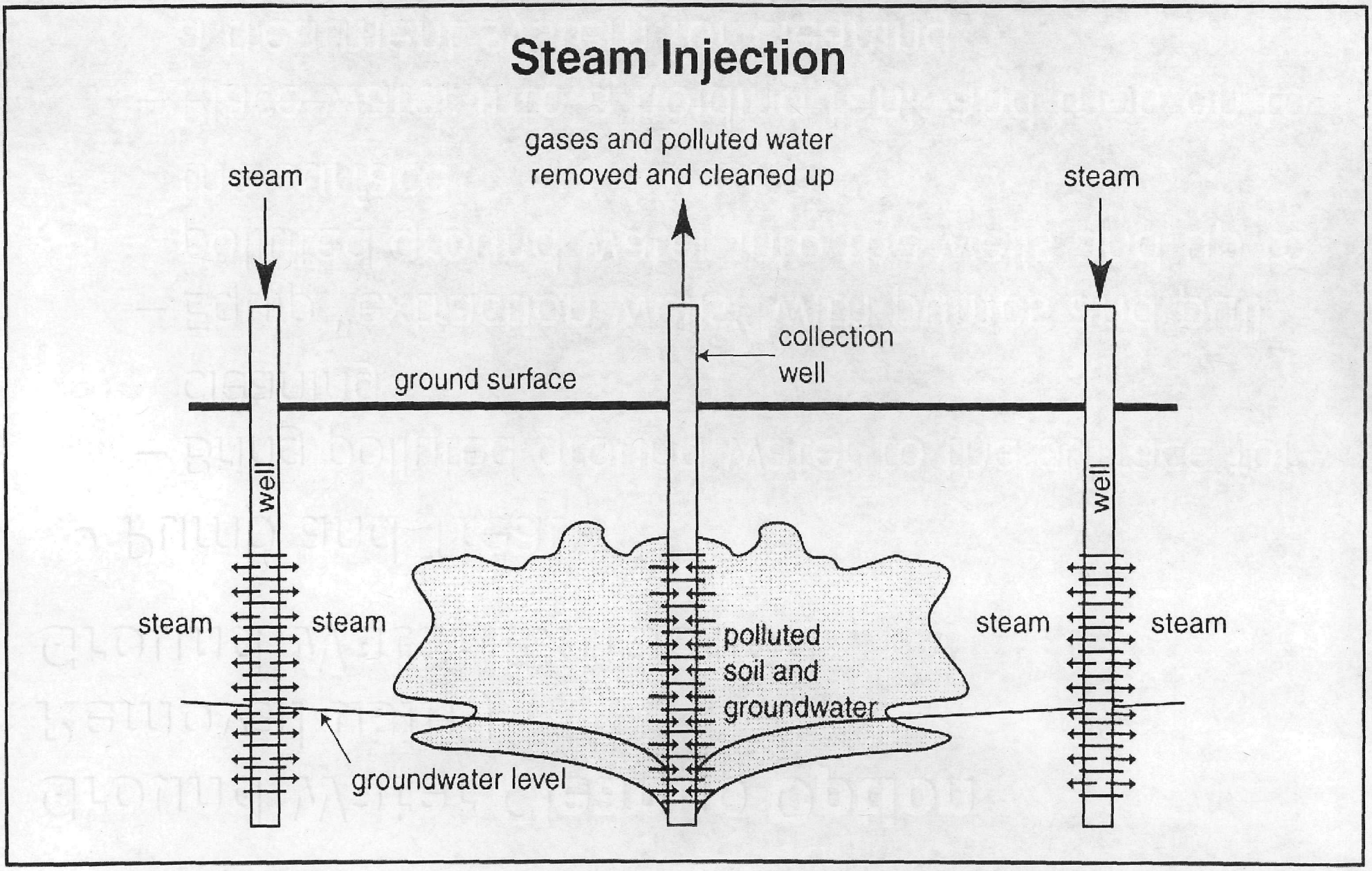
Ground Water Cleanup Option In Place Treatment using Electrical Resistance Heating

- Delivers electric current underground through wells made of steel
- Converts ground water and water in soil to steam
- Evaporates chemicals

Ground Water Cleanup Option
In Place Treatment using Steam Injection

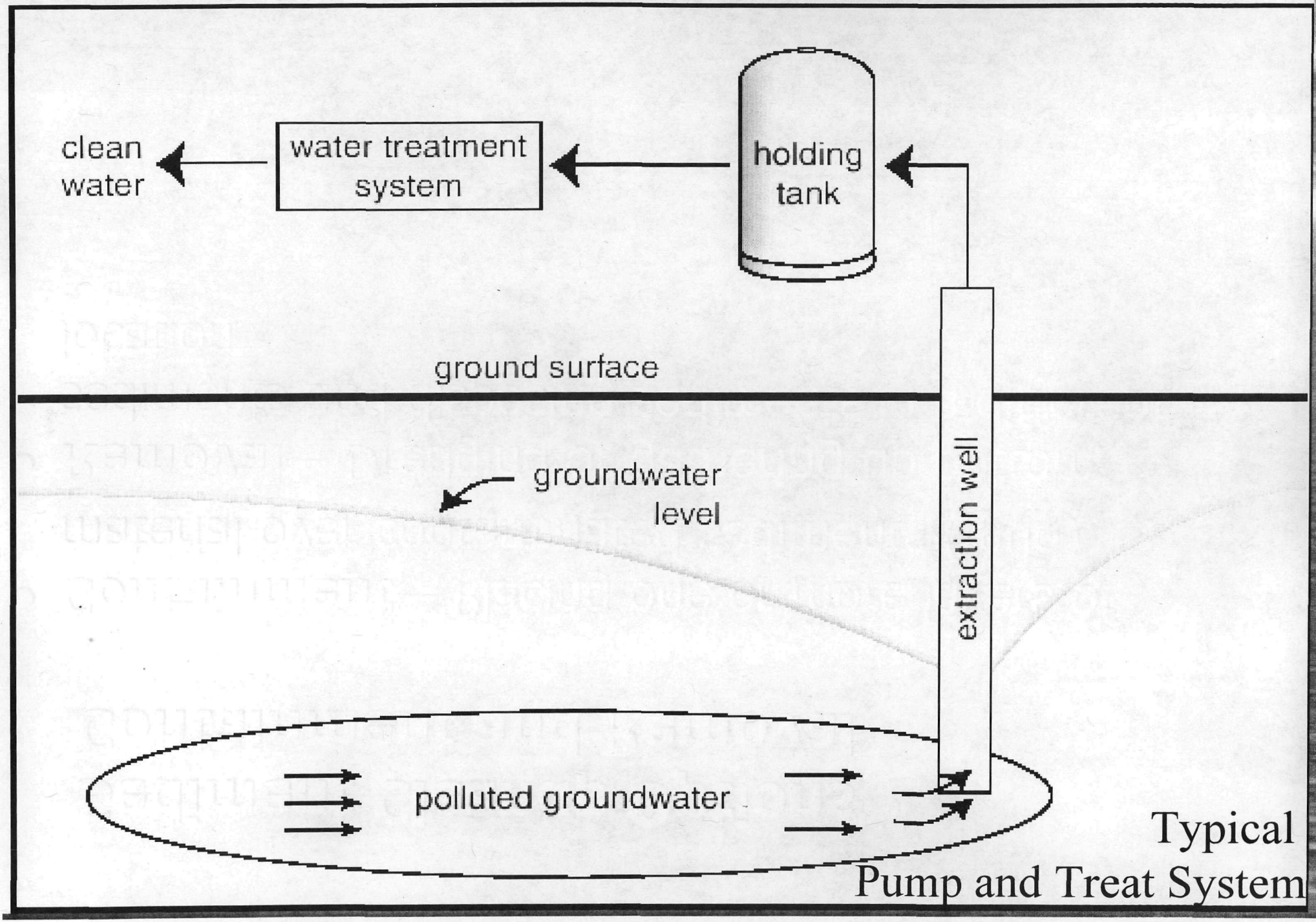
- Steam injection forces steam underground through wells drilled in polluted areas
- Steam heats the area and mobilizes, evaporates, and breaks down contaminants

In-Place Thermal Treatment



Ground Water Cleanup Option
Removal using
Ground Water Extraction

- Pump and Treat
  - Bring polluted ground water to the surface for cleaning
  - Equip "extraction wells" with pumps and pull polluted ground water into the wells and up to the surface
  - Place water into a holding tank and then on to a treatment system for cleaning



Typical Pump and Treat System

Sediment Cleanup Options Containment and Removal

- Containment – Placing one or more layers of material over contaminated sediments (mud)
- Removal – Dredging or gathering up bottom sediments and disposing sediments in a different location


Areas of Contaminated Sediments

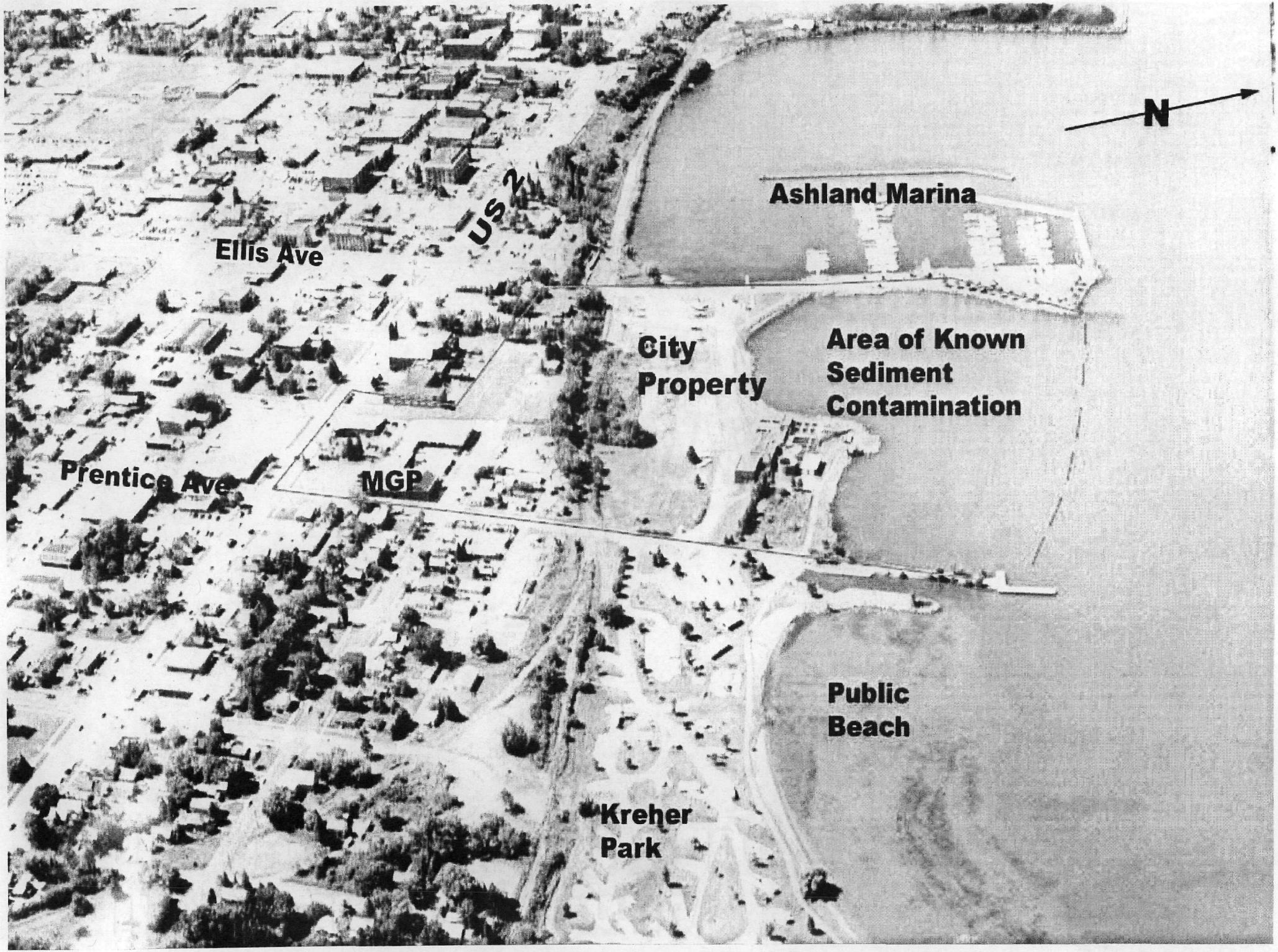
Dredging

Dry Dredging contaminated area containing NAPL

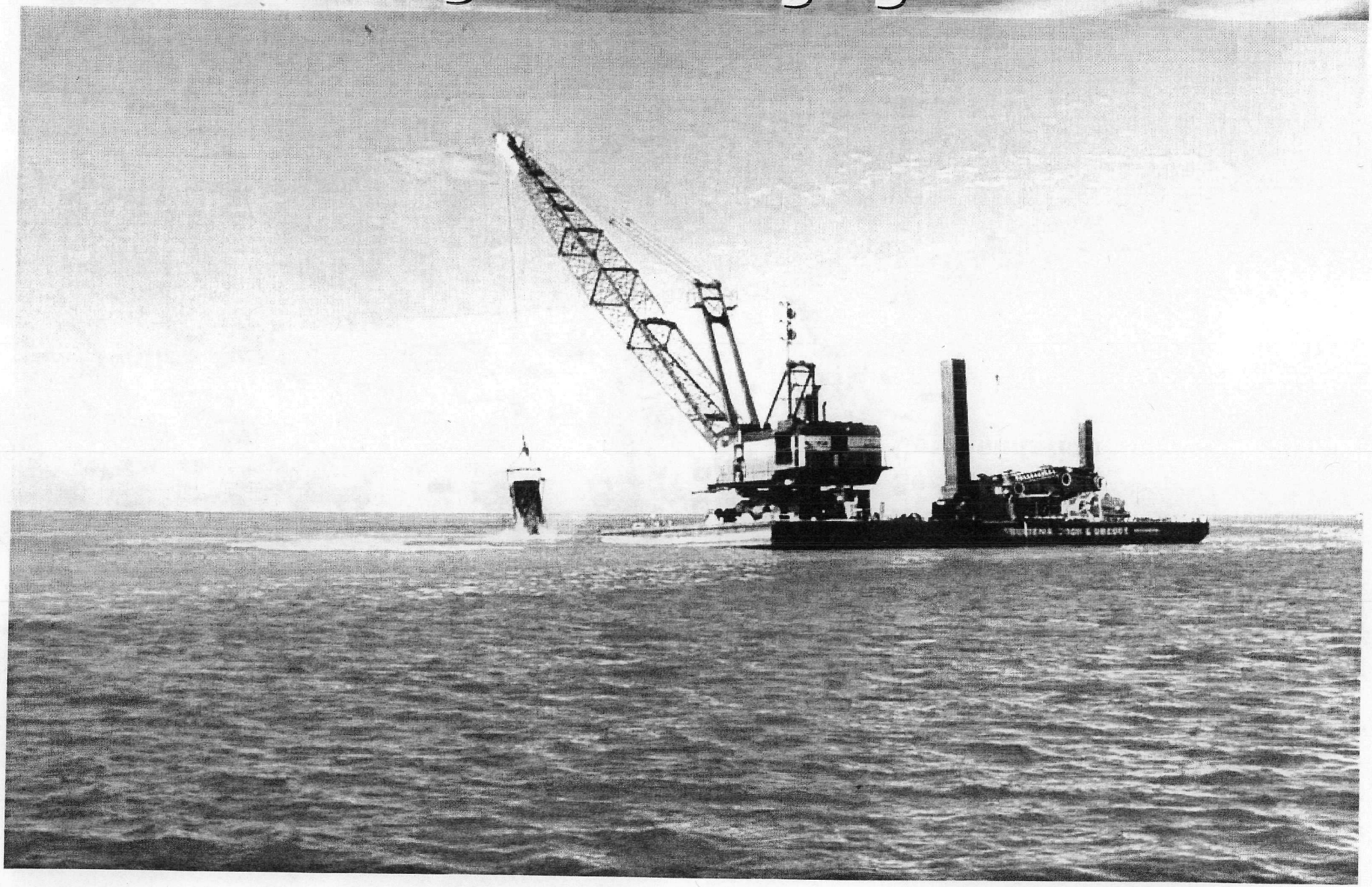
- Build sheet pile wall off Kreher Park shoreline
- Pump out water and dry out shoreline
- Remove sediment/NAPL treat on-site or remove off-site

Wet Dredging

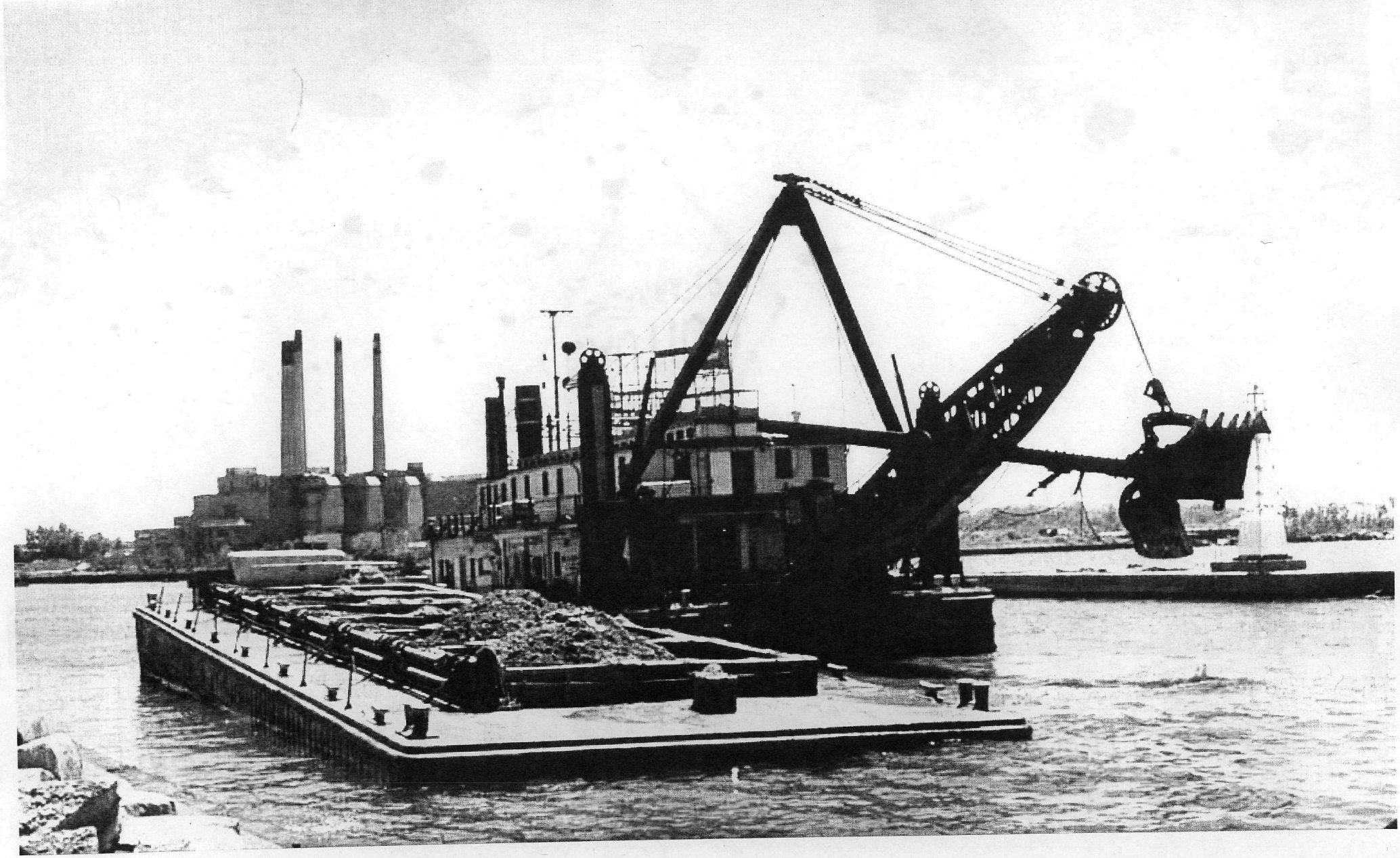
- Remove contaminated sediment outside of wall and place sediment on barge
- Treat on-site or remove off-site


N
Ashland Marina
US 2
Ellis Ave
City
Property
Area of Known
Sediment
Contamination
Prentice Ave
MGP
Public
Beach
Kreher
Park

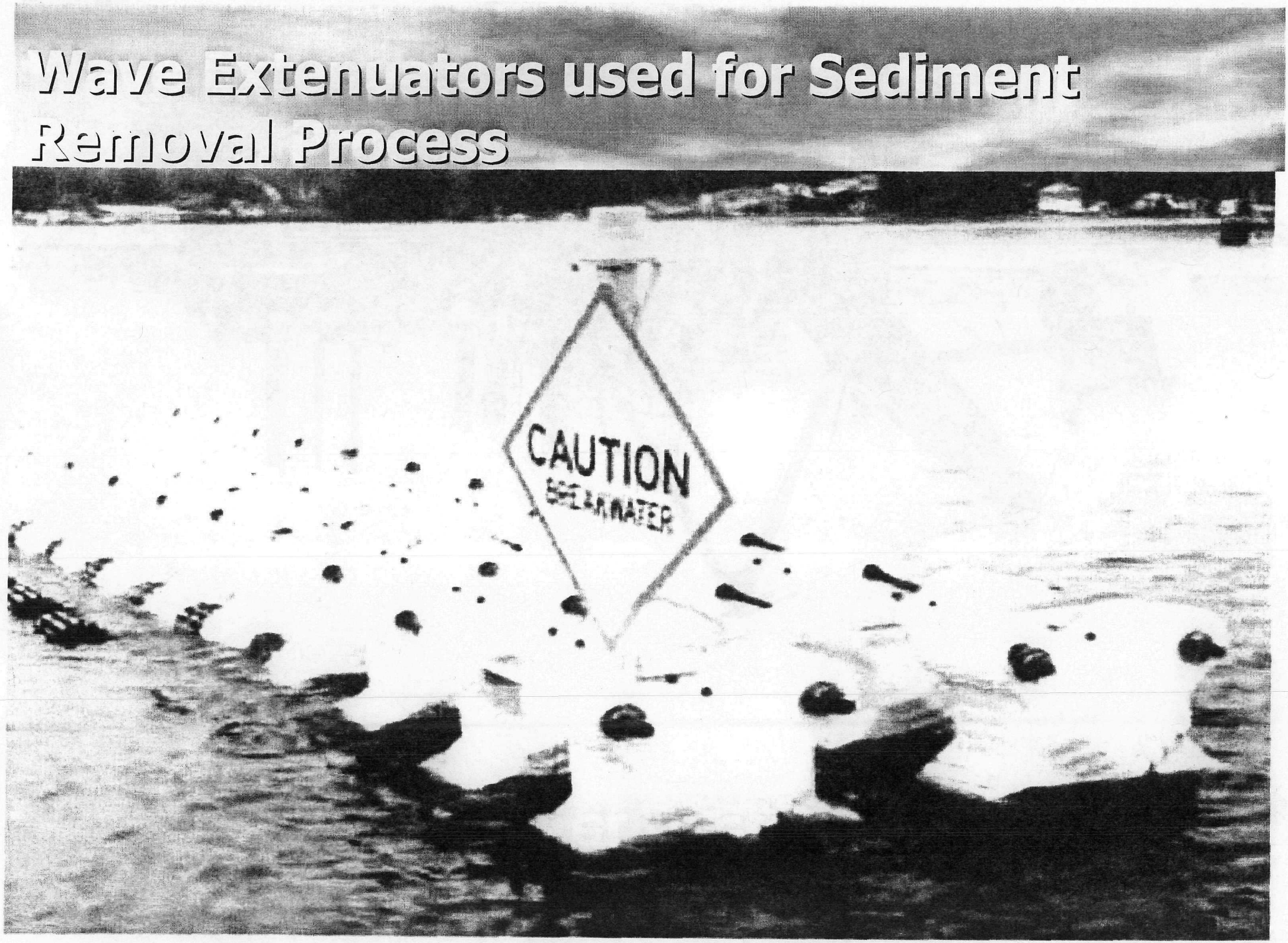
Sediment Cleanup Option
Removal using Wet Dredging



Sediment Cleanup Option
Removal using Wet Dredging

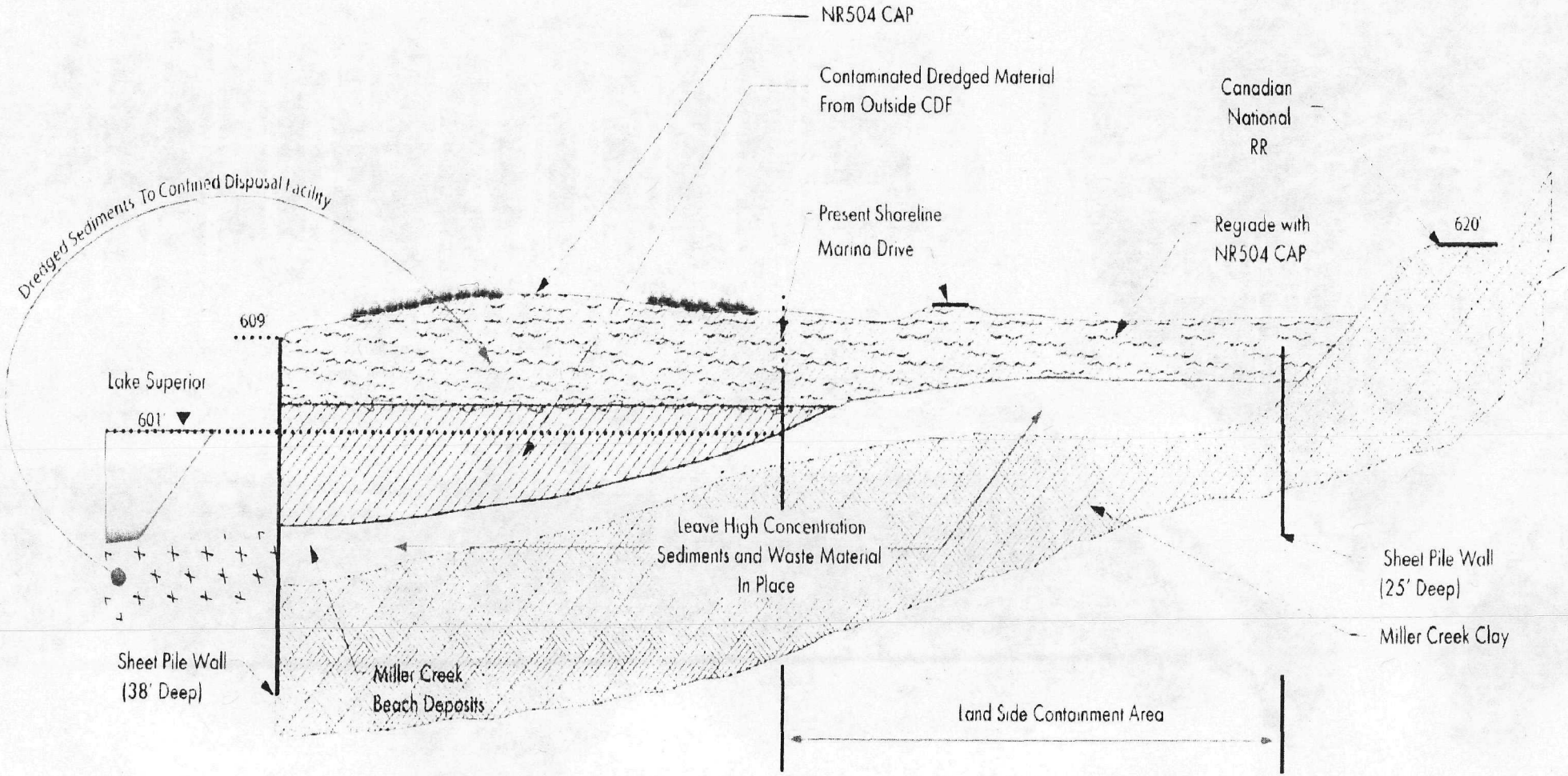


Wave Extenuators used for Sediment Removal Process



Dredging

Sediment Cleanup Option
Containment



More Sediment Cleanup Options

- Institutional Controls – Access restrictions used in combination with other options
- Monitored Natural Recovery – Biological/Chemical degradation
- Treatment – Thermal treatment using heat
- Disposal – On-site or Off-site

What's next?

- EPA recommends cleanup option and schedules proposed plan public meeting
- EPA establishes a public comment period
- EPA and DNR evaluates public reaction to the recommended cleanup
- EPA responds to comments in a "responsiveness summary"
- Record of Decision explaining selected cleanup plan is issued

EPA Remedy Review Board Goals for projects over $25 million

- Improve consistency of Superfund cleanup selections
- Improve cost-effectiveness
- Confirm decision-making at high cost sites is technically sound
- Ensure decisions follow current law